

Erin L. Towler, Ph.D.

National Center for Atmospheric Research
Capacity Center for Climate & Weather Extremes
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RESEARCH INTERESTS:

- Hydrologic risk from weather and climate extremes
- Impacts of extremes on water system and natural resources management
- Statistical downscaling and forecast verification

EDUCATION:

Ph.D. in Civil Engineering (Water Resources), University of Colorado at Boulder, 2010
Dissertation Title: Understanding and modeling the impacts of climate change on source water quality and utility planning
Advisors: Dr. Balaji Rajagopalan & Dr. R. Scott Summers

M.S. in Civil Engineering (Water Resources), University of Colorado at Boulder, 2006
Thesis title: Characterizing and incorporating uncertainty in water quality and treatment
Advisors: Dr. Balaji Rajagopalan & Dr. R. Scott Summers
Certification: *Graduate Teacher Program*, 2006

B.S. in Environmental Technology Systems, Cornell University, 2002
Magna Cum Laude

HONORS AND AWARDS:

Outstanding Reviewer for ASCE Journal of Water Resources Planning & Management, 2012.
Postdocs Applying Climate Expertise (PACE) Fellowship Award, 2010-2012
Environmental Protection Agency STAR Fellowship Award, 2009-2010
National Water Resources Institute Fellowship Award, 2007-2009
Dean's Outstanding Merit Fellowship Award, University of Colorado at Boulder, 2007

PROFESSIONAL EXPERIENCE:

2018-present *Project Scientist II:* Capacity Center for Climate & Weather Extremes, MMM, NCAR

2012-2018 *Project Scientist I:* Capacity Center for Climate & Weather Extremes, MMM, NCAR

2010-2012 *Postdoctoral PACE Fellow:* UCAR Visiting Scientists Program, NCAR and US Geological Survey, Bozeman, MT

2008-2010 *Graduate Research Assistant:* Research Applications Laboratory, NCAR

2007-2010 *Research Assistant (Doctoral):* University of Colorado at Boulder

2005-2006 *Research Assistant (Masters):* University of Colorado at Boulder

2004-2005 *Teaching Assistant:* University of Colorado at Boulder

2002-2004 *Project Engineer and Analyst:* Aquacraft, Inc., Water Engineering and Management, Boulder, CO

- *Erin Towler's CV*

FUNDED RESEARCH GRANTS

2019-2020 “Generating and evaluating temperature-conditioned Colorado River Basin streamflow ensembles.” PI; funded by the Southern Nevada Water Authority. [\$100,000 to NCAR].

2017-2019 “Detecting, Interpreting, and Modeling Hydrologic Extremes to Support Flexible Water Management and Planning.” NCAR PI (Bureau PI: D. Llewellyn; Co-PIs: A. Pinson, A. Prein); funded by the US Bureau of Reclamation. [\$120,000 to NCAR].

2014- 2019 “Collaborative Research: EaSM3 Integration of Decision-Making with Predictive Capacity for Decadal Climate Impacts.” Co-PI (PI: J. Done; Co-PIs: C. Bruyere, J. Czajkowski, J. Hoeting, E. Michel-Kerjan; R. Morss; D. Pai Mazumder); funded by NSF. [\$1,185,000 to NCAR]

PUBLICATIONS:

Refereed Articles

Towler E, Llewellyn D, Prein A, Gilleland E (2019), Extreme-value analysis for the characterization of extremes in water resources: A generalized workflow and case study on New Mexico monsoon precipitation. *Weather and Climate Extremes*, (submitted).

Towler E, McCreight J (2019), A wavelet-based approach to streamflow event identification and timing error benchmarking. *Journal of Hydrology*, (submitted).

Towler E, Lazrus H, PaiMazumder D (2019), Characterizing the potential for drought action from combined hydrological and societal perspectives, *Hydrology and Earth System Sciences*, 23, 1469-1482, <https://doi.org/10.5194/hess-23-1469-2019>.

Pournasiri Poshtiri M, Pal I, Lall U, Naveau P, **Towler E** (2019), Variability patterns of the annual frequency and timing of low streamflow days across the USA and their linkage to regional and large-scale climate. *Hydrological Processes*, doi: 10.1002/hyp.13422.

Clemins PJ, Bucini G, Winter JM, Beckage B, **Towler E**, Betts A, Cummings R, Queiroz HC (2019), An analog approach for weather estimation using climate projections and reanalysis data, *Journal of Applied Meteorology and Climatology (AMS)*, doi: 10.1175/JAMC-D-18-0255.1.

Pournasiri Poshtiri M, **Towler E**, Pal, I (2018), Characterizing and understanding the variability of streamflow drought indicators within the United States. *Hydrologic Sciences Journal*, doi: [10.1080/02626667.2018.1534240](https://doi.org/10.1080/02626667.2018.1534240).

Hewitt J, Hoeting JA, Done JM, **Towler E** (2018), Remote effects spatial process models for modeling teleconnections. *Environmetrics*, doi:[10.1002/env.2523](https://doi.org/10.1002/env.2523). *2018 Wiley-TIES Best Environmetrics Paper Award.

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Towler E, PaiMazumder D, Done J (2018), Towards the Application of Decadal Climate Predictions. *Journal of Applied Meteorology and Climatology (AMS)*, DOI: 10.1175/JAMC-D-17-0113.1.

Towler E, Lazrus H (2016), Increasing the usability of drought information for risk management in the Arbuckle Simpson Aquifer, Oklahoma, *Clim Risk Manage*, doi:10.1016/j.crm.2016.06.003.

Towler E, PaiMazumder D, Holland G (2016), A framework for investigating large-scale patterns as an alternative to precipitation for downscaling to local drought, *Climate Dynamics*, doi:10.1007/s00382-016-3116-5.

Done JM, PaiMazumder D, **Towler E**, Kishtawal CM (2016), Estimating impacts of North Atlantic tropical cyclones using an index of damage potential, *Climatic Change* doi: 10.1007/s10584-015-1513-0.

Murphy DJ, Wyborn C, Yung L, Cleveland C, Eby L, Dobrowski S, **Towler E**, and Williams DR (2016). Engaging Communities and Climate Change with Multi-scale Iterative Scenario-building in the Western US. *Human Organization*, 75 (1).

Pal I, **Towler E**, and Livneh B (2015), How can we better understand low river flows as climate changes?, *Eos*, 96,doi:10.1029/2015EO033875.

Towler E, Roberts M, Rajagopalan B, Sojda R (2013), Incorporating probabilistic seasonal climate forecasts into river management using a risk-based framework, *Water Resour Res*, 49: 4997–5008, doi:10.1002/wrcr.20378.

Towler E, Rajagopalan B, Yates D, Rodriguez A, Summers RS (2013), An integrated approach to simulate stream water quality for municipal supply under changing climate, *J Environ Eng*, 139(12): 1432-1440, doi: 10.1061/(ASCE)EE.1943-7870.0000766.

Towler E, Saab V, Sojda R, Dickinson K, Bruyère C, Newlon KR (2012), A risk-based approach to evaluating wildlife demographics for management in a changing climate: A case study of the Lewis's Woodpecker, *Environ Manage*, 50(6): 1152-1163, doi:10.1007/s00267-012-9953-z.

Bruyere CL, Holland GJ, **Towler E** (2012), Investigating the use of a Genesis Potential Index for tropical cyclones in the North Atlantic Basin, *J Climate*, 25(24): 8611-8626, doi:10.1175/JCLI-D-11-00619.1.

Towler E, Raucher B, Rajagopalan B, Rodriguez A, Yates D, Summers RS (2012), Incorporating climate uncertainty in a cost assessment for a new municipal source water, *J. Water Res Pl-ASCE*, 138:396-402, doi:10.1061/(ASCE)WR.1943-5452.0000150.

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Towler E, Rajagopalan B, Gilleland E, Summers RS, Yates D, Katz RW (2010), Modeling hydrologic and water quality extremes in a changing climate: A statistical approach based on extreme value theory, *Water Resour Res*, 46, W11504, doi:10.1029/2009WR008876.

Towler E, Rajagopalan B, Summers RS, Yates D (2010), An approach for probabilistic forecasting of seasonal turbidity threshold exceedance, *Water Resour Res*, 46, W06511, doi:10.1029/2009WR007834.

Towler E, Rajagopalan B, Summers RS (2009), Using parametric and nonparametric methods to model total organic carbon, alkalinity, and pH after conventional surface water treatment, *Environ Eng Sci*, 26(8):1299-1308.

Towler E, Rajagopalan B, Seidel C, Summers RS (2009), Simulating ensembles of source water quality using a k-nearest neighbor resampling approach, *Environ Sci Technol*, 43(5): 1407-1411.

Mayer PW, Bennett R, DeOreo W, **Towler E** (2006), Third-party billing of multifamily customers presents new challenge to water providers, *J Am Water Works Ass*, 98(8):74.*
* AWWA Water Conservation Division Best Paper Award, 2006.

Non-refereed Articles

Towler E, Llewellyn D, Barrett L, Young R (2019), Extremes of Opportunity? A generalized approach to identify intersections between changing hydrology and water management. Proceedings of the Federal Interagency Sedimentation and Hydrologic Modeling Conference (SEDHYD), Reno, NV,
https://www.sedhyd.org/2019/openconf/modules/request.php?module=oc_program&action=view.php&id=160&file=1/160.pdf

Morss RE, Done JM, Lazrus H, **Towler E**, Tye MR (2018), Assessing and Communicating Uncertainty in Decadal Climate Predictions: Connecting Predictive Capacity to Stakeholder Needs, *US CLIVAR Variations*, vol 16. No 3. Summer 2018.

Pournasiri Poshtiri M, **Towler E**, Llewellyn D, Prein AF (2018), Extremes of Opportunity: Examining Recent Trends in Warm Season Extreme Precipitation for New Mexico River Basins, *86th Western Snow Conference*, Albuquerque, NM,
<https://westernsnowconference.org/files/PDFs/2018Poshtiri.pdf>.

Hewitt J, Hoeting JA, Done JM, **Towler E** (2017) A Geostatistical Approach to Modeling Teleconnections. American Statistical Association's Section on Statistics and the Environment.

Pournasiri Poshtiri M, **Towler E**, Pal I (2017), Streamflow Drought Indicators for the Conterminous United States, *NCAR Technical Note TN-541+STR*, NCAR, 33 pp. (DOI: 10.5065/D65D8QJH).

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Towler E, Lazrus H, PaiMazumder D (2017). Characterizing drought risks and implications for water management under climate change. *NCAR Technical Note* NCAR/TN-533+STR, 25 pp, doi:10.5065/D6HD7T3N.

SELECT ORAL PRESENTATIONS:

Towler E, McCreight J, Dugger A, Gochis D, Mahoney K, Joe Mills TJ (2018) Probabilistic Verification of the National Water Model. AMS Annual Meeting, Austin, TX, January 11, 2018.

Towler E, Llewellyn D, Prein A, Pinson A, Young R, Barrett L (2017) Detecting, Interpreting, and Modeling Hydrologic Extremes to Support Flexible Water Management and Planning. USGS Upper Rio Grande Basin Focus Area Study Project Forum, Remote presentation to Albuquerque, NM, December 4, 2017 (**Invited**).

Towler E (2017) Towards the Application of Decadal Climate Predictions in Water Management. US CLIVAR (Climate Variability and Predictability Program) Summit, Predictability, Predictions, and Applications Interface Panel, Remote presentation to Baltimore, MD, August 9, 2017, (**Invited**).

Towler E PaiMazumder D, Done J, Yates D (2017) Towards the Application of Decadal Climate Predictions. Southern Nevada Water Authority: Colorado River Hydrology Research Symposium, Las Vegas, NV, May 23, 2017 (**Invited**).

Towler E (2017). Incorporating decadal climate predictions into water management. American Water Resources Association – Colorado Section, Annual Symposium, Evergreen, CO. April 28, 2017 (**Invited**).

Towler E (2017). Incorporating decadal climate predictions into water management. Front Range Water Utility Climate Change quarterly meeting, NCAR, Boulder, CO. Feb 6, 2017 (**Invited**).

Towler E (2017) Incorporating decadal predictions into water management decisions. University of Colorado Boulder Spring 2017: Hydrologic Sciences and Water Resources Engineering Seminar Series. University of Colorado Boulder, Boulder, CO. January 25, 2017 (**Invited**).

Towler E (2017). Incorporating decadal climate predictions into water management. Remote presentation to research team at University of Montana, Missoula, January 26, 2017 (**Invited**).

Towler E, Lazrus H, PaiMazumder D (2014) Interdisciplinary approach to drought risks in the context of social conflict and climate change. Society for Risk Analysis Annual Meeting 2014, Denver, CO, December 8, 2014.

Towler E (2013) Incorporating climate forecasts into aquatic management using a risk-based framework. Water Resources Seminar, University of Colorado, Boulder, CO, Jan. 23, 2013. (**Invited**).

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Towler E (2012) Evaluating and managing extreme hydrologic risk in natural and human systems. *Workshop on Statistical Applications to Climate Extremes*, Zurich Development Center, Zurich, Switzerland, Oct. 29, 2012.

SELECT POSTER PRESENTATIONS:

Towler E, PaiMazumder D, Done J (2018) Towards the Application of Decadal Climate Predictions in Water Management. AMS Annual Meeting, January 10, 2018. Austin, TX.

Towler E and Lazrus H. (2016) Increasing the usability of drought information for risk management. 41st Annual Natural Hazards Research and Applications Workshop. July 10-13 in Broomfield, Colorado.

Towler E, PaiMazumder D, Done J, Yates D (2016) Incorporating decadal predictions into water management decisions. AGU Fall Meeting, San Francisco, CA. Dec 13, 2016.

Towler E, Lazrus H, PaiMazumder D (2015) "Interdisciplinary approach to drought risks in the context of water management conflict under climate change." North Central Climate Science Center Open Science Conference, Colorado State University, Fort Collins, CO, May 21, 2015.

Towler E, Lazrus H, PaiMazumder D (2014) "Avoiding Drought Risks and Potential Water Management Conflict Under Climate Change." AGU Fall Meeting, San Francisco, CA, December 18, 2014.

Towler E, PaiMazumder D, Holland G (2014), "Improving future predictions of drought: A new hybrid statistical-dynamical downscaling approach." *National Science Foundation EaSM Investigator Meeting*, Washington, DC, January 2014. [Poster].

Towler E, Lazrus H, PaiMazumder D (2012), "Risky business: Incorporating decadal predictions into decision-making." *AGU Fall Meeting*, San Francisco, CA, Dec. 3, 2012, (Invited).

SERVICE AND CONTRIBUTIONS:

Service and Contributions – External

- 2013–2017 PhD Dissertation Committee & Chair for Maryam Pournasiri Poshtiri (Civil Engineering, University of Colorado Denver)
- 2012–present Member: American Geophysical Union; Earth Science Women's Network
- 2011 DISCCRS VI Symposia Scholar
- 2004 Licensure: Enrolled as a Engineer-Intern in Colorado

Service and Contributions – Internal

- 2012-present Instructor for Climate and Weather Extremes Tutorial, MMM, NCAR
- 2015-2018 UCAR ECSA (Early Career Scientists Assembly) steering committee
- 2015-present UCAR Oversight Committee for the Postdocs Applying Climate Expertise

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(PACE) Fellowship Program

2015-present Mentor for NCAR's Undergraduate Leadership Workshop, SOARS Academy